that a clear and definite presentation of chemical theories is quite essential to their proper comprehension. While it is manifestly highly important that the student should not only be acquainted with the facts upon which chemical theories rest, but should also appreciate fully the nature of conclusions reached by inductive reasoning, still a constant reiteration of the doubts, uncertainties, or conflicting evidence, which surround the various hypotheses, seems to us ill advised in an elementary text-book.

Although structural chemistry in a certain sense is independent of the valence hypothesis, still this hypothesis was one of the earliest and most natural inductions resulting from the study of the constitution of chemical compounds, and is so interwoven with the present theories, that any attempt to exclude it rigorously from a discussion of the subject merely adds an unnecessary complication. We confess that we do not think the ordinary student will read with much interest the pages devoted to structural formulae, or 'proofs' of their correctness, if he chances to see beforehand the opening sentence of the retrospect which follows (p. 232).

"A study of the preceding chapters on constitution will show that no absolute meaning is to be attached to the word. Constitutional formulas are those which suggest certain reactions, and recall analogies. The formula CH_3-OH does not mean that hydroxyl (OH) is necessarily present in the compound, or that CH_3 is present, but that the different parts of the compound bear such relations to each other that when the compound is decomposed, it acts as if the parts were united as the formula indicates. The formula suggests possibilities; it may not represent realities."

If the author be correct, and "it cannot be denied that we are now in a period of chemistry which may fairly be called one of *formula worship*" (p. 100), it is very certain that formula worship has been of vastly greater service to chemistry than agnosticism is ever likely to be.

We fail to see that any advantage is gained by the introduction of new conventional signs in place of those already in common use, to represent the linkage of the carbon atoms in the olefinet and acetylen series (pp. 202, 206); nor can we understand why the double linkage of the nitrogen atoms, which the author apparently accepts, since he uses the old sign (=) in his formulae for the azo- and the diazo-compounds (p. 222), stands upon any more trustworthy experimental basis. Furthermore, we cannot help expressing our surprise that the author should have ventured the statement, "Of the substitution products of benzene, which contain three substituting groups, more than three varieties have been observed" (p. 208), which seems a bit of rashness hardly consistent with the caution elsewhere displayed.

THE CORNELL MATHEMATICAL LIBRARY.

Cornell university library. Special lists, No. 1. Mathematics. Ithaca, N.Y., 1883. 92 p. 8°.

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WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

MATHEMATICS.

Kummer's surface.—Professor Cayley, in a brief note 'on the sixteen-nodal quartic surface,' remarks, that Riemann's theory of the bitangents of a plane quartic leads at once to a very simple form of the equation of the sixteen-nodal quartic surface; viz.,